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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
|-----------------|-------------|----------------------|---------------------|------------------|

10/038,125

01/02/2002

Geon Choe

SJO920010040US1

7458

7590

10/14/2004

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EXAMINER

OMETZ, DAVID LOUIS

ART UNIT

PAPER NUMBER

2653

DATE MAILED: 10/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

RECEIVED  
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Technology Center 2600

# Office Action Summary

Application No.

10/038,125

Applicant(s)

CHOE, GEON

Examiner

David L. Ometz

Art Unit

2653

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 23 August 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-9, 12 and 13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 3-9, 12 and 13 is/are rejected.
- 7) ☒ Claim(s) 2 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

|                                   |                                       |  |             |
|-----------------------------------|---------------------------------------|--|-------------|
| <b>Notice of References Cited</b> | Application/Control No.<br>10/038,125 | Applicant(s)/Patent Under<br>Reexamination<br>CHOE, GEON |             |
|                                   | Examiner<br>David L. Ometz            | Art Unit<br>2653   | Page 1 of 1 |

**U.S. PATENT DOCUMENTS**

| * |   | Document Number<br>Country Code-Number-Kind Code | Date<br>MM-YYYY | Name         | Classification |
|---|---|--|-----------------|--------------|----------------|
|   | A | US-6,452,761                                     | 09-2002         | Carey et al. | 360/320        |
|   | B | US-6,700,754                                     | 03-2004         | Kula et al.  | 360/324.1      |
|   | C | US-  |                 |              |                |
|   | D | US-  |                 |              |                |
|   | E | US-  |                 |              |                |
|   | F | US-  |                 |              |                |
|   | G | US-  |                 |              |                |
|   | H | US-  |                 |              |                |
|   | I | US-  |                 |              |                |
|   | J | US-  |                 |              |                |
|   | K | US-  |                 |              |                |
|   | L | US-  |                 |              |                |
|   | M | US-  |                 |              |                |

**FOREIGN PATENT DOCUMENTS**

| * |   | Document Number<br>Country Code-Number-Kind Code | Date<br>MM-YYYY | Country | Name | Classification |
|---|---|--|-----------------|---------|------|----------------|
|   | N |  |                 |         |      |                |
|   | O |  |                 |         |      |                |
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|   | R |  |                 |         |      |                |
|   | S |  |                 |         |      |                |
|   | T |  |                 |         |      |                |

**NON-PATENT DOCUMENTS**

| * |   | Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages) |
|---|---|---|
|   | U |   |
|   | V |   |
|   | W |   |
|   | X |   |

\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

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1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 8/23/04 has been entered.

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 3-9, 12, 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 10-256621 in view of Journal of Applied Physics article "Oxygen as a surfactant in the Growth of Giant Magnetoresistive Spin Valves" to Egelhoff et al (hereinafter "Egelhoff"). JP '621 shows a method for providing precise control of magnetic coupling field in NiMn top spin valve head (see col. 2, lines 37-39 for permissible antiferromagnetic materials, specifically "NiMn" with a thickness of between "5-25nm" ), comprising: forming at least one copper layer (3 or 5) in a NiMn top spin valve; and depositing remaining layers (free layer 4, pinned layer 6, and antiferromagnetic layer 7) of the NiMn top spin valve head. However, JP'621 does not show the copper seed 3 and the copper spacer layer 5 being partly oxidized with oxygen. Egelhoff disclosed a spin valve head that oxidizes the copper spacer layer to greatly enhance the magnetoresistive effect (see pages 6144-6147). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to oxidize the copper layers in the spin valve of JP'621 as taught by Egelhoff as doing this would enhance the GMR effect over that

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of a non-oxidized spin valve head, and would increase the beneficial specular reflection of electrons by creating a smoother or more well ordered growth pattern of the layers as taught by Egelhoff. It is noted that with regard to the dependent claims 3, 4, 6, 7, 12, and 13 the various gains in the spin valve performance (e.g. claim 3-- reduces the ferromagnetic coupling field without deteriorating GMR effect or resistance; claim 4-- provides a negative coupling field without affecting GMR effect or resistance;; claim 7-- provides stronger growth of NiFe(111) and NiMn(111) with respect to NiFe(200) and NiMn(002) phases; claim 12--provides an approximately 15% increase in amplitude of the output of a NiMn spin valve head at the same coupling field; claim 13-- does not affect asymmetry performance) would all be inherent in oxidizing the copper layers in the JP'621 reference as the structure is the same as Applicant's NiMn top spin valve.

4. Claim 2 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

5. Applicant's arguments filed 8/23/04 have been fully considered but they are not persuasive. Applicant asserts on page 5 that neither Takuji nor Egelhoff suggest an NiMn top spin valve head having an NiMn pinning layer with a thickness of less than 200 Angstroms. However, the examiner maintains that Takuji teaches in col. 2, line 39 that the thickness range of the NiMn pinning layer may lie between 5-25nm, which converts to 50-250 Angstroms, thus meeting the claimed limitation of less than 200 Anstroms.

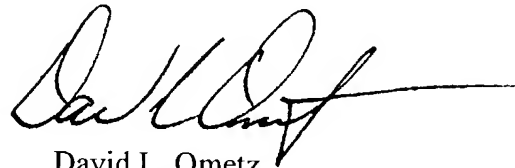
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.6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Carey et al teaches the oxidation of gap layers in a magnetoresistive head while Kula et al teaches oxidation of the copper spacer in a spin valve magnetoresistive head.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David L. Ometz whose telephone number is (703) 308-1296. The examiner can normally be reached on M-W, 6:00-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William Korzuch can be reached on (703) 305-6137. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

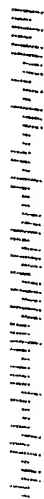


David L. Ometz  
Primary Examiner  
Art Unit 2653

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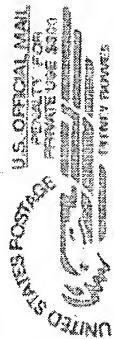
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